Table 2.1.7.1 Avoidance, Minimization, and Mitigation Measures by Landscape Unit

Source of Impact	Impact	Avoidance, Minimization, and Mitigation Measures	Corresponding Figures*
Light and Glare Impacts (All Landscape Units)	Glare impacts to motorists, residents due to fugitive construction lighting	Mitigation Measure VM-12: Construction Lighting Mitigation. Limit all construction lighting to within the area of work and avoid light trespass through directional lighting, shielding, and other measures as needed.	There are no figures related to construction lighting/glare impacts.
	Headlight glare impacts to roadside residents due to CRZ clearing	Mitigation Measure VM-5a: Replacement planting within proposed new project ROW	

2.1.8. CULTURAL RESOURCES

Regulatory Setting

In this document, "cultural resources" is used to refer to all historic and archaeological resources, regardless of significance. "Historic resources" and "historic properties" refer to those cultural resources that have been listed or found eligible for listing in the National Register of Historic Places (NRHP) and/or the California Register of Historic Places (CRHP).

The National Historic Preservation Act (NHPA) of 1966, as amended, sets forth national policy and procedures regarding historic properties, defined as sites, buildings, structures, districts, and objects listed in or eligible for the NRHP. Section 106 of NHPA requires federal agencies to take into account the effects of their undertakings on such properties and to allow the Advisory Council on Historic Preservation (ACHP) the opportunity to comment on those undertakings, following regulations issued by ACHP (36 CFR 800). On January 1, 2004, the *Programmatic Agreement Among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as it Pertains to the Administration of the Federal-Aid Highway Program in California* (hereafter, the PA) went into effect for all Caltrans projects, both state and local, with FHWA involvement. The PA takes the place of the ACHP's regulations, streamlining the Section 106 process and delegating certain responsibilities to Caltrans.

Under California law, cultural resources are protected by the California Environmental Quality Act (CEQA), as well as Public Resources Code Section 5024.1, which established the CRHP. Section 5024 requires state agencies to identify and protect state-owned historic resources that meet NRHP listing criteria. Section 5024.5 further requires state agencies to provide notice to, and to confer with the State Historic Preservation Officer (SHPO) before altering, transferring, relocating, or demolishing state-owned historic resources.

Affected Environment- A review of existing literature documenting cultural resources in the project vicinity, archival research, and an intensive field survey for archaeological and architectural resources in the project study area were completed over a three-year period beginning in January 2003. A record search was conducted at the Northwest Information Center (NWIC) at Sonoma State University, through the Office of Historic Preservation's California Historical Resources Information Center, on December 6, 2002, and updated on June 21, 2005. Research was also conducted at the Caltrans Library, Napa County Historical Society, Solano County Archives, Solano County Public Library-Fairfield Branch, Solano County Assessor's Office, California State Library, California State Archives, California State Railroad Museum Library, and the Shield Library at the University of California, Davis.

Prior to the finalization of the project footprint, a project study area was used for research and survey efforts. This study area was larger than what was later finalized to be the Area of Potential Effect (APE). In accordance with the PA, the APE was established in consultation with Caltrans Office of Cultural Resource Studies Professionally Qualified Staff (PQS). The APE maps were signed by Caltrans staff, on March 23, 2007. The Archaeological APE encompasses all proposed areas of direct impact, including existing and proposed right-of-way, staging areas, and easements. The Architectural APE includes the area bound by the Archaeological APE, as well as any built properties immediately adjacent to the project to take into account the potential for indirect effects.

An Archaeological Survey Report (ASR) was completed to document the archaeological survey efforts in June 2006. The thirty-six archaeological surveys previously conducted within 0.40 km (0.25 miles) of the project study area were studied and reviewed. An archaeological survey was performed by PQS archaeologists for this project but did not result in the identification of any prehistoric archaeological or historic archaeological materials within the study area. The ASR identified two prehistoric and three historic

cultural resources, which had been previously recorded within a 0.40 km (0.25 miles) of the APE; however, no archaeological resources were identified within the APE.

Architectural resources were documented in a Historic Resources Evaluation Report (HRER), which was completed in May 2006. The HRER identified thirty-six properties within the Study Area. A PQS architectural historian identified eleven properties to be historic-era, i.e. constructed in or prior to 1960. The remaining properties were documented to be exempt from evaluation as outlined in Attachment 4 of the PA. Ten of the eleven evaluated properties were determined to not be eligible for listing in the NRHP. The remaining property, the Greenwood House, had been previously determined eligible in 1978, but since that time has been relocated to a business park. The house does not meet the National Register criteria for a moved building, and, thus, was determined to no longer be eligible for listing in the NRHP.

Completed in May 2007, a Historic Property Survey Report (HPSR) summarizes the findings of the ASR and HRER: eleven evaluated architectural resources, none of which were determined to be eligible for listing in the NRHP, nor were they be determined to be historical resources for the purposes of CEQA. In accordance with the PA, Caltrans has determined a Finding of No Historic Properties Affected.

Impacts- The HPSR concluded with a Finding of No Historic Properties Affected, and was transmitted to SHPO on May 7, 2007. SHPO concurred with the finding of No Historic Properties Affected on July 3, 2007 (for a copy of the concurrence letter, see Appendix E).

Although no historic resources were identified within the project boundaries, it is still possible that buried archaeological deposits exist. If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area will be diverted until a qualified archaeologist can assess the nature and significance of the find.

If human remains are discovered, State Heath and Safety Code Section 7050.5 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and the County Coroner contacted. Pursuant to PRC Section 50.97.98, if the remains are thought to be Native American, the coroner will notify the Native American Heritage Commission (NAHC) who will then notify the Most Likely Descendent (MLD). At this time, the person who discovered the remains will contact Jennifer Darcangelo, Chief, Office of Cultural Resource Studies, so that they may work

with the MLD on the respectful treatment and disposition of the remains. Further provisions of PRC 5097.98 are to be followed as applicable.

Avoidance, Minimization, and/or Mitigation Measures- No mitigation is required as no historic resources were identified within the project APE. Therefore, further consultation with SHPO will not be required for this project.

2.2. Physical Environment

2.2.1. HYDROLOGY AND FLOODPLAIN

Regulatory Setting - Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The Federal Highway Administration requirements for compliance are outlined in 23 CFR 650 Subpart A.

In order to comply, the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments
- Risks of the action
- Impacts on natural and beneficial floodplain values
- Support of incompatible floodplain development
- Measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values affected by the project.

The base floodplain is defined as "the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year." An encroachment is defined as "an action within the limits of the base floodplain."

Affected Environment – Jameson Canyon area has a mild and wet winter, but a hot and dry summer. The mean annual rainfall is approximately 50.8 cm (20 inches) according to the District 4 "Mean Annual Rainfall Map" dated September 1968. According to Caltrans District 4 the rainfall intensity is 3.30 cm (1.3 inches) in one hour for return period 100 years.

Jameson Canyon proposed roadway alignment lies on the northern side of Jameson Canyon. The south side of the alignment is an embankment leading to the Southern Pacific right-of-way at the bottom of the Canyon. The hills on the north and south of Jameson Canyon rise 214 m (700 ft) to 275 m (900 ft). The highest peak in the project

area is Elkhorn Peak, at 405 m (1330 ft) elevation, about 3 km (1.8 miles) north of the Canyon. Jameson Canyon. This highest peak drains both to the east and the west from a ridge near Creston, in the center of the Canyon. The Canyon drains into Fagan Creek and Sheehy Creek in the west, and to an unnamed creek in the east.

According to Caltrans' policy, when upgrading the existing drainage facilities, the peak discharge should be limited to the flood frequencies so as to not exceed the existing constraints. Therefore, for all major cross culverts, the existing capacities are employed for the culvert design.

There are ten existing culverts, which have a total drainage area of approximately 1416 hectares (3500 acres).

In the proposed SRs 29/12 interchange area, there are eight existing culverts, which run across SR 29 within the project limits.

Capacity of the culverts and pipes are analyzed based on free outfall and the existing allowable headwater depth. In reality, surcharging can occur in the system and the culverts can pass more or less flow depending on conditions upstream and downstream of the culvert.

Impact – The project will not affect the hydrology for offsite drainage facilities owned by Caltrans, the County of Solano, the County of Napa, Southern Pacific Railway Company, or any other entity. At the same time, converting the existing 2-lane highway to a 4-lane conventional highway with 3.6 m (11.81 ft) median openings will not change the hydrology or hydraulics of any of the waterways crossing the highway.

To minimize impacts to both upstream and downstream of the floodplain areas, special effort will be made to maintain the existing culvert capacity at this crossing. Routine construction procedures are required to minimize impacts on the floodplain.

Avoidance, Minimization, and/or Mitigation Measures – In the Jameson Canyon area the basic consideration of drainage design is to protect the highway against damage from storm water. This project proposes to extend all the major cross culverts, and the proposed drainage facilities will collect the additional runoff created by adding impervious area to the drainage shed. The proposed major cross culverts to be extended are listed as follows:

(i) At shed A4, the existing culvert is proposed to extend 25 m (80 ft) in length in order to accommodate the 3.6 m (11.81 ft) median and new section of roadway. Therefore the existing 1830 mm x 1830 mm (6 ft x 6 ft) culvert will have about a total length of 42 m (138 ft) across the highway.

(ii) Similarly at shed A5, a new section of 1220 mm x 1220 mm (4 ft x 4ft) reinforced concrete box (RCB) in a length of 25 m (80 ft) is proposed to add to 1220 mm x 1220 mm (4 ft x 4 ft) RCB.

(iii) At shed A6, a 30 m (100 ft) long of 1200 mm (4 ft) corrugated steel pipe (CSP) is proposed to connect to outfall of the 1450 mm x 900 mm (4.8 ft x 3 ft) corrugated metal pipe arch (CMPA) with a junction structure.

(iv) At combined shed A7 & A8, the existing 3050 mm x 1520 mm (10 ft x 5 ft) RCB is proposed to extend about 25 m (80 ft) at the downstream of the unnamed creek.

(v) At shed A8, a 1350 mm x 50 m (4.5 ft x 165 ft) CSP is proposed to replace 1800 mm x 1100 mm x 40 m (6 ft x 3.67 ft x 130 ft) CMPA.

(vi) At shed A9, the existing 1220 mm x 1220 mm (4 ft x 4 ft) RCB is proposed to extend 20 m (65 ft) in length at the outfall.

(vii) At shed A10, the existing double 1830 mm x 915 mm (6 ft x 3 ft) RCB will be required to extend 10 m (30 ft) at the downstream for the median and new roadway section.

For the proposed SRs 29/12 interchange area the basic consideration of drainage design is to protect the highway against damage from storm water, taking into account the effect of the proposed improvement on traffic and property. This project intends to extend all the major cross culverts, and the proposed drainage facilities will collect the additional runoff created by adding impervious area to the drainage shed. The preliminary recommendations for the two proposed build alternatives, a Single Point interchange and a Tight Diamond interchange, are as follows:

(i) On SR 29 south of the intersection, at approximately station 11+20, there are no significant changes on the existing roadway section, and the existing 1830mm x 2440mm

(6 ft x 8 ft) RCB is still in sound condition, therefore the 1830 mm x 2440 mm (6ft x 8 ft) RCB will remain and no modifications are required.

(ii) On SR 29 north of the intersection, at approximately station 24+20, the existing 2440 mm x 2440 mm (8'x 8') RCB is proposed to extend about 3.66 m (12 ft) and 1.22 m (4 ft) at the upstream and downstream respectively to accommodate the proposed auxiliary lanes.

Culvert/Pipe Hydraulic Capacity

Capacity of the culverts and pipes was analyzed based on free outfall and the existing allowable headwater depth. In reality, surcharging can occur in the system and the culverts can pass more or less flow depending on conditions upstream and downstream of the culvert.

Flood Plain

Affected Environment – In the Jameson Canyon Area a small portion of the project limits is within the 100-year floodplain. The approximate location in Napa County is KP 3.0. The existing cross culvert is encroached in this floodplain.

In the Interchange area, a drainage course is within the 100-year floodplain is located in Napa County at K.P. 3.0 (P.M. 1.90).

Impact – The existing 1830 mm x 1830 mm (6 ft x 6 ft) RCB is about 16 m (57 ft) long in the direction of flow. The proposed downstream extension is about 25 m (80 ft) long in order to accommodate the 3.6 m (11.81 ft) median and new section of roadway. The extension of the RCB will be no significant impact to 100-year hydraulic condition as follows:

To minimize impacts to both upstream and downstream of the floodplain areas, special effort will be made to maintain the existing culvert capacity at this crossing. In order to do that the existing culverts will be upgraded as discussed above. Caltrans standard construction procedures will be implemented to minimize impacts on the floodplain during construction.

2.2.2. WATER QUALITY AND STORM WATER RUNOFF

Regulatory Setting- The primary federal law regulating Water Quality is the Clean Water Act, (CWA), issued by the U.S. Environmental Protection Agency (EPA). The EPA delegated its authority in California to the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCB). The RWQCB prepares and adopts the Water Quality Control Plan, (Basin Plan), a master policy document for managing surface and groundwater quality in the region. The State Water Resources Control Board and the Regional Water Quality Control Board issue permits which implement the standards included in the Basin Plan as well as other requirements of the State Water Code and the federal Clean Water Act.

Section 401 of the CWA requires a water quality certification from the State Board or Regional Board when a project: 1) requires a federal license or permit (a Section 404 permit is the most common federal permit for Caltrans projects), and 2) will result in a discharge to waters of the United States.

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit system to regulate municipal and industrial storm water discharges, including discharges from highways. To ensure CWA compliance and facilitate processing of routine projects, the SWRCB has issued Caltrans a blanket NPDES Statewide Storm Water Permit to regulate storm water discharges from Caltrans facilities (Order No. 99-06-DWQ, CAS000003).

In addition, the SWRCB has issued a statewide Construction General Permit for construction activities (Order No. 98-08-DWQ, CAS000002), that applies to all storm water discharges from land where clearing, grading, and excavation result in disturbances of at least 0.4 hectares (1 acre) or more. Construction activity that results in soil disturbances of less than 0.4 hectares (1 acre) is subject to the General Permit if the construction activity is part of a larger Common Plan of Development totaling 0.4 hectares (1 acre) or more of soil disturbing activities, or if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. All projects that are subject to the construction general permit require a Storm Water Pollution Prevention Plan (SWPPP). Caltrans' construction projects that are less than 0.4 hectares (1 acre) need to incorporate Water Pollution Prevention Plans (WPCP).

Affected Environment – This project is within the San Francisco Bay Regional Water Control Board (RWQCB) jurisdiction (Region 2), which is responsible for

implementation of State and Federal water quality protection laws and regulations in the vicinity of the project site. The water quality section will be discussing existing condition, effects and impacts on storm water and on ground water for both alternatives for this project.

Storm Water- The western portion of the project, including the proposed interchange, lies within the Napa River- San Pablo Watershed, (hydrologic sub-area no. 206.50). The eastern portion of the SR 12 widening project lies with the Fairfield-Suisun Watershed, (HSA nos. 207.21 (Benicia) and 207.23 (Suisun Slough).

Storm water from the projects drains through a series of open ditches and pipes to the various tributaries along the project limits. To the west, two primary creeks affected by that project are Sheehy Creek, north to the project and Fagan Creek, south of SR 12. Both creeks are tributaries of the Napa River, which drains into the Carquinez Strait and eventually San Pablo Bay. The eastern portion drains through a series of tributaries and makes its way to the Suisun Slough, which eventually drains to the Suisun Bay.

The existing beneficial use of Napa River include agricultural supply, cold freshwater habitat, ocean, fish migration, municipal and domestic supply, navigation, preservation of rare and endangered species, water contact and non-contact recreation, fish spawning, warm freshwater habitat, and wildlife habitat. Suisun Slough's beneficial uses include water contact and non-contact recreation, fish spawning, warm freshwater habitat, and wildlife habitat.

The Napa River, approximately 3.2 km (2 miles) west of the project, is listed per Section 303d for nutrients, pathogens, and sedimentation/ siltation. Suisun Slough, 2.4 km (1.5 mi) east, is impaired for diazinon.

Ground Water- This project is located in the *Napa Valley and Suisun/Fairfield Valley Groundwater Basins*. The existing beneficial uses of both these groundwater resources according to the Basin Plan include municipal and domestic water supply, industrial process water supply, industrial service water supply, and agricultural water supply.

Impact-

Storm Water- Caltrans has performed many studies to monitor and characterize highway storm water runoff throughout the State. Pollutants of Concern in Caltrans runoff found from the "Final Report of the Caltrans BMP Retrofit Pilot Program", were phosphorus, nitrogen, copper (total or dissolved), lead (total or dissolved), zinc (total or dissolved),

sediments, general metals (unspecified metals), and litter. Some sources of these pollutants are natural erosion, phosphorus from tree leaves, combustion products from fossil fuels, trash and falling debris from motorists, and the wearing of break pads.

The SR12 Jameson Canyon Road widening will disturb approximately 40 hectares (about 100 acres) and add 13.8 hectares (34 acres) of new pavement. The SRs 29/12 interchange will disturb about 15.8 hectares (39 acres) under both alternatives and add 5.9 hectares (14.7 acres) under the alternative 1 (the Tight Diamond) configuration and 6.2 hectares (15.4 acres) under alternative 2 (the Single Point). The added pavement for the improvements will increase roadway runoff; however, the project will result in less than significant impact to the beneficial uses and water quality objectives of the receiving water bodies with the incorporation of erosion control measures, and design pollution prevention and treatment BMPs.

The no build would have no added water quality impacts than what already exists.

Ground Water- Groundwater may be encountered during excavation work for the cross culvert extensions and pile work for the bridge at SRs 29/12. Early discussion will be initiated regarding the handling and disposal of groundwater water during construction. The groundwater will need to be tested for potential contamination as a part of the Hazardous Waste Site Investigation. Handling and disposal of the groundwater will be based on the level of contaminants reported in the Caltrans Site Investigation Report.

(a) Construction Site Best management Practices (BMPs)

BMPs are implemented during construction activities to reduce pollutants in storm water discharges throughout construction. Grading of existing slopes will be required. Temporary silt fence, stockpile cover, stabilized construction entrance/exit and temporary soil stabilizers are some of the temporary erosion and water pollution control measures that may be utilized in combination to prevent and minimize soil erosion and sediment discharges during construction. Given a soil disturbance of greater than 0.4 hectares (1 acre), a Storm Water Pollution prevention Plan (SWPPP) will be developed during construction. This dynamic document addresses the deployment of various erosion and water pollution control measures that are required to changing construction activities.

(b) Permanent Design Pollution Prevention BMPs

Design Pollution Prevention BMPs are permanent measures to improve storm water quality by reducing erosion, stabilize disturbed soil areas, and maximize vegetated surfaces. Erosion control measures will be provided on all disturbed areas to the extent

feasible. These measures can utilize a combination of source and sediment control measures to prevent and minimize erosion from soil disturbed areas. Source controls can utilize erosion control netting in combination with hydroseeding. The biodegradable netting is effective in providing good initial mechanical protection while seed applied during the hydroseeding operation germinates and establishes itself. Other forms of source control such as tacked straw may also be used when applicable. Sediment controls such as biodegradable fiber rolls can be used to retain sediments and to help control runoff from disturbed slope areas. These measures will be investigated during the design phase.

Outlet protection and velocity dissipation devices placed at the downstream end of culverts and channels are also Design Pollution Prevention BMPs that reduce runoff velocity and control erosion and scour. The need of these devices for this project will also be further investigated during the design phase.

(c) Permanent Treatment BMPs

Treatment BMPs are permanent devices and facilities treating storm water runoff. Caltrans approved Treatment BMPs are Biofiltration Swales, Infiltration Basins, Detention Basins, Traction Sand Traps, Dry Weather Flow Diversions, Media Filters, and Gross Solids Removal Devices (GSRDs). This project will incorporate Treatment BMPs to the maximum extent practicable. Consideration of Treatment BMPs will follow the Evaluation Documentation Form process and documented in the Storm Water Data Report for this project.

Currently we anticipate that 12 hectares (30 acres) of pavement will be treated along SR 12. At the intersection of SRs 29/12, we anticipate that 3 hectares (7 acres) of pavement will be treated. One hundred percent treatment is not feasible primarily due to environmentally sensitive areas, the geological terrain, and right of way constraints.

Biofiltration swales and strips are being proposed along SR 12 and SR 29. Biofiltration swales are vegetated channels that receive storm water runoff. Biofiltration strips, also known as vegetated buffer strips, are vegetated sections of land over which runoff flows as overland sheet flow. Both biofiltration strips and swales are mainly effective at removing debris and solid particles as well as some dissolved constituents that are adsorbed to the soil surfaces.

Biofiltration swales will be incorporated where drainage ditches are being proposed to convey pavement runoff without large amount of off-site shed and where access for

maintenance is feasible. Biofiltration strips will be provided in locations where side slopes are 4(H):1(V) or flatter and a minimum width (in direction of flow) of 3.6 m (12 ft) can be obtained within State right of way.

A possible infiltration/ detention basin at the interchange will also be reviewed during design for feasibility.

A more detailed review will be conducted during the design phase to increase treatment opportunities.

2.2.3. GEOLOGY / SOILS / SEISMIC / TOPOGRAPHY

2.2.3.1. Geology/Soils

Affected Environment – The SR 12 Jameson Canyon Road lies on the eastern edge of the California Coast Ranges, a complex, folded, northwest-trending range. The ranges consist mostly of folded and faulted sedimentary rocks with minor metamorphic and volcanic components. The region is highly seismically active, with numerous active or potentially active faults nearby. In addition, the major San Andreas, Hayward, and Calaveras Faults are near enough to produce significant ground shaking at the site. The Green Valley Fault lies just 1.2 km (0.74 miles) east of Jameson Canyon, and marks the boundary of the Coast Ranges and the Great Valley alluvial plain to the east.

Jameson Canyon lies between Green Valley Fault Zone and the West Napa Fault Zone. The Canyon lies in the Eocene Markley Formation. The Markley Formation is folded with folded axes trending northwest. The Canyon drains both to the east and west. The high point of the canyon floor, near Creston, roughly coincides with the axis of an anticline. Jameson Canyon is a rare east-west trending feature in the northwest-trending Coast Ranges.

At the SR 12 Jameson Canyon Road, the Markley formation exposed in the cut slopes consists of gray silstone and fine- to medium-grained, micaceous, arkose sandstone. At some locations in the Markley Formation, clay layers may cause sliding. Older Alluvium deposits are located at the western end of the project.

The proposed SRs 29/12 Interchange Area, located in the Napa Valley, just east of the Napa River, is contained within the Coast Range Geomorphic Province of California. The

province is characterized by a series of northwesterly trending ridges, faults, and valleys. It is bounded on the east by the Great Valley and on the west by the Pacific Ocean.

The ground level is generally flat with an average ground elevation of 22 m (72 ft) with reference to the mean sea level. The drainage is towards east.

The project site is located at the western end of Jameson Canyon, where alluvial deposit from the canyon are truncated by the south-flowing Napa River. Ponds have been constructed near the project area using the tidal influence of the San Pablo Bay to the south. At the intersection of SRs 29/12, the geology consists of undifferentiated Quaternary alluvium originating from Jameson Canyon. The proximity to the Canyon would suggest the underlying material consists of gravel and sand with minor clay lenses. However, the soil composition may vary over a short distance. Thus, site-specific powered borings will be needed to better characterize the sub-surface soil and rock conditions.

The soil survey map produced by the Soil Conservation Service (1978) indicates that soils within the project area may consist of the following soil series: Bale Series, Coombs Series, Fagan Series, Haire Series and Hambright Series. The Unified Soil Classification System was used to classify all types of soils.

The climate at the project site is generally of Mediterranean type. Most of the rainfall occurs from October through April—minimum 5.08 mm (0.2 inches) and maximum 10,160 mm (400 inches). Temperatures range from 5 to 30 Celsius throughout the year.

Topography and Drainage- Please see Section 2.2.1. in Hydrology, Affected Environment.

There is an abandoned pumping station and water line on the north side of SR 12 near the intersection of Red Top Road. The pumping station and water line will need to be removed prior to construction. Several small farming structures will need to be relocated as well.

2.2.3.2 *Seismicity*

Mualchin (1996) lists active faults around the project area. Based on the data provided in the California Seismic Hazard Map.

The active Green Valley Fault borders the eastern end of Jameson Canyon, and is the controlling fault for this site. It is the northern extension of the Green Valley/Concord Fault. It intersects SR 12 at the eastern end of Jameson Canyon, near the intersection of 12 and 80. The Green Valley/Concord Fault is a Holocene-active fault. Mualchin (1996) lists the Maximum Credible Earthquake Magnitude as 6.75.

Rockfall has been a recurring problem at this cut slope for several years. This problem is prevalent during intense rainstorms and usually boulders of varying sizes fall onto the highway. For the embankment construction, ground improvement techniques may be needed prior to fill placement. There are no settlement problems at the site. There may be elastic ground heave problems where deep excavations are made.

Impacts- Jameson Canyon is a narrow canyon area where bedrock is exposed at most of the locations, therefore, the effect of seismic shaking should be minimal.

Land slides on the south side of the Canyon will not affect the alignment since it is somewhat protected by the creeks and railway right-of-way to the south.

In general, any excavation that removes the lower portion or toe of a landslide will lead to destabilization of the slope and could cause landslides to reactivate. This risk of slope instability shall be greater if planned excavations increase in height. On the other hand, by reducing the amount of excavations and their distance from existing slide areas will reduce the risk of triggering landslides. Reducing the risk from slope instability will help to control unanticipated costs related to slide mitigation during construction. With these general understanding these are some of the recommendations to avoid.

Geotechnical Recommendations- Because of the magnitude of this project, topographical fluctuations and complexity of the soil and rock formations, significant subsurface exploration and investigations will be needed for this project.

Caltrans will perform horizontal drilling at locations where we anticipate the use of soil nail walls and/or rock bolting. Surface seismic refraction studies will be done to assess

the stability of rock masses as well as define boundaries between different types of rock formations. In case of rocks with discontinuities, joint-surveys will be conducted by Engineering Geologists to arrive at predominant joint orientations. Laboratory tests will be conducted on retrieved soil and rock samples.

The current alternative is a conventional, two-lane highway with 3.6 meters (11.8 ft) median. This has considerably reduced the geotechnical demand on the project. The recommended types of retaining walls are Soil Nail Walls, Soldier Pile Walls, Pier Walls for cut slopes. Caltrans recommends proceeding with the soil nail wall for the cut slopes.

Soil Nail Walls- Soil-nail wall system has been selected *in lieu of* cantilevered retaining walls. However, soil nail wall may not be suitable to be installed in soft clayey soils, loose granular soils, swelling soils, highly fractured rocks with open joints and rock masses with discontinuities that dip towards the excavation face.

Caltrans will be using Soil Nail Walls for some of the high retaining wall within the project area. One of them is about 30.48 m (100 ft) high at Post Mile 1.5 in Solano County along the new proposed widening along Jameson Canyon. Most of the cut walls using Soil Nail Walls are at the west bound direction.

For fill walls Caltrans is using MSE (Mechanically stabilizing Earth) Walls for most east-bound direction of the project. The MSE walls with metallic reinforcing strips or polymeric strips with pre cast facing elements would be a viable option. The recommended maximum design height of a MSE wall is 15 m (50 ft) but since one of the retaining walls is higher than that Caltrans will be building a two-tier wall.

The Interchange Area- Based on limited data from the adjacent project, groundwater may be present at shallow depth. Groundwater levels in the project area could not be assessed since no drilling was performed. Investigations on groundwater levels will be done as part of subsurface investigations during the GDR phase of geotechnical investigations. It should be noted that groundwater conditions are controlled by seasonal changes in rainfall and abnormal weather conditions.

According to the cross sections embankment fills as high as 9 m (30 ft) will need to be constructed over the existing ground at the project site. If conventional fills (imported borrow, structure backfill, etc.) rather than lightweight fills are used, the proposed fills will impose significant pressure on the existing groundwater. During construction, the

groundwater level may rise by about 1 m (3 ft) higher than its seasonal level. However, once the project is completed, it will revert to its seasonal fluctuations.

Because of the proposed significant high embankments, existing high groundwater, and foundation clay material, consolidation settlements are expected. The ground improvement techniques, surcharge, and wick drains may be used to reduce the settlement time significantly. This will be determined during design stage of the project. Because the proposed new interchange will be an elevated structure, the geotechnical concern for the project with respect to hazardous waste generated by excavation will be insignificant.

Preliminary Recommendations and Conclusion-

The relatively flat topography of the site indicates that no significant excavation is anticipated at the site. However, if temporary cuts are required for any reason, we recommend the cuts to be no steeper than 1:1 for up to 3 m (10 ft) high and 1.5:1 for higher cut slopes.

Because of the expected consolidation settlements in this project, the MSE walls are recommended for most of the fill area around the interchange. Based on Caltrans preliminary cost analysis, MSE walls are also most cost effective considering the wall heights fort he proposed project.

2.2.4. HAZARDOUS WASTE/ MATERIALS

Regulatory settings- Hazardous materials and hazardous wastes are regulated by many state and federal laws. These include not only specific statutes governing hazardous waste, but also a variety of laws regulating air and water quality, human health and land use.

The primary federal laws regulating hazardous wastes/materials are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The purpose of CERCLA, often referred to as Superfund, is to clean up contaminated sites so that public health and welfare are not compromised. RCRA provides for "cradle to grave" regulation of hazardous wastes. Other federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- Clean Water Act

- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety & Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, Executive Order 12088, Federal Compliance with Pollution Control, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved. Hazardous waste in California is regulated primarily under the authority of the federal Resource Conservation and Recovery Act of 1976, and the California Health and Safety Code. Other California laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup and emergency planning.

Worker health and safety and public safety are key issues when dealing with hazardous materials that may affect human health and the environment. Proper disposal of hazardous material is vital if it is disturbed during project construction.

Affected Environment - A hazardous waste site investigation was performed by Caltrans that indicates the presence of aerially deposited lead (ADL) along the SR 12 area in Solano and Napa Counties.

Impact – The aerial lead testing for the above-referenced project has been completed. There is aerially deposited lead (ADL) along SR 12 and the interchange area. This conclusion is based on approximately 500 soil samples that were collected within the proposed project footprint. An environmental regulatory database search was also conducted for any known hazardous material sites in the project area. The survey shows no known hazardous material sites that pose a threat to the either alternatives for the project.

No soil samples were reported to contain lead concentrations that exceed the Total Threshold Limit Concentration (TTLC) of 1000 mg/kg. Based on the statistical analysis, the soil, if treated as a whole, may be considered non-hazardous. However, if the construction work is staged in a manner that segregates the excavated soil, waste soil from some areas may be considered hazardous and should be managed under the Department of Toxic Substance Control (DTSC) guidance. If management of the soil

under the DTSC Variance is required, the statistical data indicate that the soil may be handled within condition 2 of the variance. This condition requires that the soil be used as fill beneath a pavement structure designated to protect the soil from water infiltration and 1.5 m (5 ft) above the the highest seasonal water table elevation.

Avoidance, Minimization, and/or Mitigation Measures: No mitigation is currently proposed.

2.2.5. AIR QUALITY

Regulatory Setting - The Clean Air Act as amended in 1990 is the federal law that governs air quality. Its counterpart in California is the California Clean Air Act of 1988. These laws set standards for the quantity of pollutants that can be in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). Standards have been established for six criteria pollutants that have been linked to potential health concerns; the criteria pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), lead (Pb), and sulfur dioxide (SO_2). Under the 1990 Clean Air Act Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve Federal actions to support programs or projects that are not first found to conform to State Implementation Plan for achieving the goals of the Clean Air Act requirements. Conformity with the Clean Air Act (CAA) takes place on two levels—first, at the regional level and second, at the project level. The proposed project must conform at both levels to be approved.

Regional level conformity in California is concerned with how well the region is meeting the standards set for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and particulate matter (PM). California is in attainment for the other criteria pollutants. At the regional level, Regional Transportation Plans (RTP) are developed that include all of the transportation projects planned for a region over a period of years, usually at least twenty. Transportation Improvement Program (TIP) is a set of highway and transit projects to be funded over the next three years. Based on the projects included in the RTP and TIP, an air quality model is run to determine whether or not the implementation of those projects would conform to emission budgets or other tests showing that attainment requirements of the CAA are met. If the conformity analysis is successful, the regional planning organization, such as Metropolitan Transportation Commission (MTC) for the Bay Area and the appropriate federal agencies, such as the Federal Highway Administration, make the determination that the RTP and TIP are in conformity with the State Implementation Plan (SIP) for achieving the goals of the CAA. Otherwise, the

projects in the RTP must be modified until conformity is attained. If the design and scope of the proposed transportation project are the same as described in the RTP and TIP, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project-level also requires "hot spot" analysis if an area is "nonattainment" or "maintenance" for CO and/or particulate matter. A region is a "nonattainment" area if one or more monitoring stations in the region fail to attain the relevant standard. Areas that were previously designated as nonattainment areas but have recently met the standard are called "maintenance" areas. Conformity does include some specific standards for projects that require a hot spot analysis. In general, projects must not cause the CO standard to be violated, and in "nonattainment" areas the project must not cause any increase in the number and severity of violations. If a known CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

Affected Environment – The project area is on rolling terrain and surrounded by either open spaces or farms with sparsely spaced residences on either side. This project is located within the San Francisco Bay Area Air Basin, which is characterized by complex terrain consisting of coastal mountain ranges, inland valleys and bays. The project area stretches from the Carquinez Strait region of the air basin to the southern Napa Valley region. The pollution potential is usually moderated in the Carquinez Strait region due to high wind speeds. Air pollution potential is high in the Napa Valley region, especially at the northern portion. Summer and fall prevailing winds can transport locally and non-locally generated ozone precursors northward where the valley narrows, effectively trapping and concentrating the pollutants under stable conditions.

The Bay Area Air Quality Management District (BAAQMD) administers air quality regulations for the San Francisco Bay Area. The CAA requires States to submit a State Implementation Plan (SIP) for area designated as nonattainment for federal air quality standards. Under the Transportation Conformity Rule developed by US EPA and US DOT, most transportation projects, regional transportation plans, and transportation improvement programs, must meet "conformity" requirements in areas that are nonattainment for Federal air quality standards. The MTC is the local Metropolitan Planning Organization (MPO) responsible for preparing regional transportation plans and demonstrating their conformity with the SIP. Project-level conformity is demonstrated by showing that a project comes from a conforming regional plan and program, with

substantially the same "design concept and scope" that was used for the regional conformity analysis; showing that it will not cause localized CO, PM_{10} and/or $PM_{2.5}$ standards to be exceeded in nonattainment or maintenance areas for those pollutants; and verifying that it will not interfere with timely implementation of Transportation Control Measures called out in the SIP.

The San Francisco Bay Area Air Basin has not exceeded the national or state CO standards for many years and is now recognized as an attainment area for CO. The Bay Area is currently classified as a marginal nonattainment area under the 8-hour national ozone standard. For PM_{10} and $PM_{2.5}$, the Bay Area is currently designated as unclassified for the national 24-hour standards. It is in attainment for the $PM_{2.5}$ national annual arithmetic mean standards. It is non-attainment under the state standards for both PM_{10} and $PM_{2.5}$. EPA has released its revisions to the particulate matters (PM_{10} and $PM_{2.5}$) standards in September 2006. Area designations based on the new standards would be finalized in 2009. Table 2.2.5.1 below lists the attainment status for various pollutants under the State and national standards.

TABLE 2.2.5.1 - Ambient Air Quality Standards & Bay Area Attainment Status

Pollutant	AVERAGING TIME	California Standards		National Standards	
		Concentration	Attainment Status	Concentration	Attainment Status
Ozone	8 Hour	0.070 ppm (137µg/m^3)	U	0.08 ppm	N
	1 Hour	0.09 ppm (180 µg/m^3)	N	-	
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m^3)	A	9 ppm (10 mg/m^3)	A
	1 Hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	A
Nitrogen Dioxide	Annual Average	-		0.053 ppm (100 µg/m^3)	A
	1 Hour	0.25 ppm (470 µg/m^3)	A	-	
Sulfur Dioxide	Annual Average	-		80 µg/m3 (0.03 ppm^3)	A
	24 Hour	0.04 ppm (105 µg/m^3)	A	0.14 ppm (365 µg/m^3)	A
	1 Hour	0.25 ppm (655 µg/m^3)	A	-	
Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	N		
	24 Hour	50 µg/m^3	N	150 µg/m^3	U
Particulate Matter - Fine ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	N	15 µg/m^3	A
	24 Hour			35 µg/m^3	U
Sulfates	24 Hour	25 µg/m^3	A		
Lead	Calendar Quarter			1.5 µg/m^3	A
	30 Day Average	1.5 µg/m^3	A	-	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3	U	-	
Vinyl Chloride (chloroethene)	24 Hour	0.010 ppm (26 µg/m^3	No information available	-	
Visibility Reducing particles	8 Hour(1000 to1800 PST)		A	-	
A=Attainment N=Nonattainment U=Unclassified					
mg/m^3=milligrams per cubic meter		ppm=parts per million		µg/m^3=micrograms per cubic meter	
Source: BAAQMD					

BAAQMD maintained monitoring stations collect ambient air quality data around the Bay Area on a continuous basis. Data from the two monitoring stations closest to the project are listed in Table 2.2.5.2.

TABLE 2.2.5.2 – Ambient Air Quality Data

Pollutants	Category	Monitoring Stations					
		Vallejo – Tuolumne St.			Napa-Jefferson Ave.		
		2003	2004	2005	2003	2004	2005
Ozone	1-hr Max. (ppm)	0.101	0.104	0.087	0.105	0.092	0.091
	8-hr Max. (ppm)	0.073	0.069	0.07	0.083	0.072	0.067
CO	1-hr Max. (ppm)	4.0	4.0	3.9	4.7	3.7	3.2
	8-hr Max. (ppm)	2.9	3.4	3.1	2.5	2.0	2.0
PM_{10}	Nat. 24-hr Max. ($\mu g/m^3$)	38.2	50.8	49.4	29.0	---	13.7
	Nat. Annual Avg. ($\mu g/m^3$)	16.8	18.9	16.8	17.7	---	2.4
	State 24-hr Max. ($\mu g/m^3$)	39.0	51.4	52.3	30.8	---	13.7
	State Annual Avg. ($\mu g/m^3$)	17.3	19.6	---	---	---	---
$PM_{2.5}$	Nat. 24-hr Max. ($\mu g/m^3$)	30.8	39.7	43.8	---	---	---
	Nat. Annual Avg. ($\mu g/m^3$)	9.4	11.1	9.7	---	---	---
	State 24-hr Max. ($\mu g/m^3$)	30.8	39.7	43.8	---	---	---
	State Annual Avg. ($\mu g/m^3$)	9.4	11.1	---	---	---	---
"---" no data available Source: Cal EPA, Air Resources Board							

Methodology

a. Carbon Monoxide (CO) Carbon monoxide (CO) is a colorless, odorless, poisonous gas. A product of incomplete burning of hydrocarbon-based fuels, carbon monoxide consists of a carbon atom and an oxygen atom linked together.

This air quality analysis utilizes the "Transportation Project-Level Carbon Monoxide Protocol", dated December 1997, prepared by the Institute of Transportation Studies, University of California at Davis and approved by the EPA for use in the Bay Area. The protocol is based on the fact that the Bay Area meets air quality standards for carbon monoxide and permits a qualitative approach to determine its air quality impacts. Use of this protocol was recommended by the Bay Area Interagency Conformity Task Force, which is the interagency consultation group established pursuant to EPA's conformity regulation and the Bay Area's conformity SIP. This protocol was approved by MTC in

Resolution No. 3075 on June 24, 1998. It was accepted by EPA as an alternative to the quantitative analysis procedure specified in the 1997 Conformity Rule.

Since the Bay Area was designated an attainment area for CO on June 1, 1998, the protocol indicates that an analysis by comparison is appropriate for this project. This involves a comparison of the proposed project with an existing facility within the air district that has the potential of creating higher CO concentrations at the time of attainment demonstration. A list of the features to be compared is contained in Section 4.7.2 of the CO Protocol. As shown in Table 2.2.5.3, conditions on Route 101 from Tully Road to Story Road in San Jose are used for comparison purposes.

TABLE 2.2.5.3 - Comparison of Mainline Conditions

	Parameters	SRs 12/29 - Build Alternatives 1 & 2	Route 101 – Existing Tully Rd to Story Rd
A	Receptor Distance	22m (72')	6.1m (20')
B	Roadway Geometry	4 lanes	8 lanes
C	Worse case Meteorology	Coastal Valley	Coastal Valley
D	AADT Volumes	24,900 (2005) 52,300 (2025)	246,000 (2005)
E	Hot/Cold Starts	10/50 EB 10/50 WB	10/50 NB 10/50 SB
F	Percent HDG trucks	1.8%	2.4%
G	8 Hr. Background CO	2.8 ppm (2005)	5.7 ppm (2005)

The AADT for Route 101 between Tully Road and Story Road represents current traffic volumes as expressed in the Caltrans publications '2005 Traffic Volumes on California State Highways' and "2005 Annual Average Daily Truck Traffic on the California State Highway System." Since all of the above conditions are satisfied, there is no reason to expect higher CO concentrations at the Jameson Canyon project area from the mainline traffic. Although nearby intersections will experience traffic volume increases as a function of this project and anticipated growth in the area, volumes will be well below similar intersections in the Bay Area, and therefore will not cause state or federal CO standards to be exceeded.

b. Particulate Matters (PM_{10} and $PM_{2.5}$)

Particulate Matter (PM_{10} and $PM_{2.5}$) refers to airborne particles that are less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$). Transportation related particulate matter is both a regional and project-level issue. The coarser particulate matters, PM_{10}, are typically formed by earth-based material that enter the air through a variety of actions including "entrainment" into the atmosphere by wind blown dust. Particles from brake and tire wear, from pavement wear, and from other vehicle degenerative processes also contribute to this PM size. However, the greatest contribution from this size category has "natural" rather than "man-made" origins. $PM_{2.5}$ are thought to be more a product of combustion sources. This material is believed to penetrate deeper into the lungs and remain lodged there rather than exhaled, causing negative impacts on health.

The U. S. EPA issued a final conformity rule on March 10, 2006 that establishes the transportation conformity criteria and procedures for determining which transportation projects must be analyzed for local air quality impacts in $PM_{2.5}$ and PM_{10}. Since the San Francisco Bay Area is either in the attainment or unclassified status for the national PM_{10} and $PM_{2.5}$ standards, there is no need to perform particulate matters hot-spot analyses at the project level. The Bay Area is non-attainment for the State PM_{10} and $PM_{2.5}$ standards.

c. Mobile Source Air Toxics (MSATs)

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics.

Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. The EPA has identified six priority transportation toxics. They are benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene.

The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources, 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in vehicle miles traveled (VMT), these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent. As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full twenty-one and the primary six MSATs.

Evaluating the environmental and health impacts from MSATs on a proposed highway project involves several key elements. Including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human

health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

In summary, when a highway is widened and, as a result, moves closer to receptors (residences, business buildings), the localized level of MSAT emissions for the Build Alternative could be higher relative to the No Build Alternative. This could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today. Construction activity may generate a temporary increase in MSAT emissions. Construction mitigation includes strategies that reduce engine activity or reduce emissions per unit of operating time. The EPA has listed a number of approved diesel retrofit technologies; many of these can be deployed as emissions mitigation measures for equipment used in construction.

d. Conformity with State Implementation Plan (SIP)

The current Regional Transportation Plan for the Bay Area, known as *Transportation 2030 Plan*, was adopted by MTC on Feb. 23, 2005. The 2007 TIP is the most current conforming TIP, which was adopted by MTC on July 26, 2006 and approved by the Federal Transit Administration (FTA), and the Federal Highway Administration (FHWA) on October 2, 2006. The TIP conformity determination was made under the motor vehicles emissions budget contained in the 2001 1-Hour Ozone Attainment Plan for the ozone precursors and the 1996 Carbon Monoxide Maintenance Plan (and 1998 Revisions). The status of Transportation Control Measures (TCMs) A through E from the 2001 Ozone Attainment Plan was also reviewed to demonstrate their timely implementation. This conformity finding puts the nine-county region in conformity with SIP and all transportation-related federal air quality requirements.

Impacts

Carbon Monoxide- This project would result in a facility that will be smaller and less congested than comparable facilities within the same Air District. Since the comparable facilities are in an area that meets air quality standards (maintenance area), this project will also meet microscale air quality requirements and will therefore have no significant impact on air quality or cause state or federal CO standards to be exceeded.

Particulate Matter- Qualitatively, we expect that this project will not have adverse effects on microscale particulate levels since actual non-truck vehicle emissions of particulates are believed to be small, and the number of heavy duty diesel trucks using the facility will not be increased significantly as a result of the project. While the Bay Area does list yearly the number of times the State particulates standards were exceeded, the closest monitoring stations show minimal problems. At the Vallejo-Tuolumne Street monitoring station, the State 24-hour PM_{10} standard was exceeded once each year for 2004 and 2005 and none in 2003. The standard was not exceeded from 2003 to 2005 at the Napa-Jefferson Avenue station. For the State annual mean $PM_{2.5}$ standard, the standard was not exceeded at the Vallejo-Tuolumne Street from 2003 to 2005. The levels in the project area are expected to be substantially lower than at these monitoring stations.

Mobile Source Air Toxics - This report includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives in this study. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:

> Some recent studies have reported that proximity to roadways is related to adverse health outcomes—particularly respiratory problems. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. The

available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects. The amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects. Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

Under the FHWA's Interim Guidance on Air Toxic Analysis in NEPA Documents issued on February 3, 2006, this project is considered of having low potential MSAT-effects.

For each alternative in this study, the amount of MSAT emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives is slightly higher than that for the No Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes.

The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Because the estimated VMT under each of the Alternatives are relatively close to each other, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 % between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of

the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The additional travel lanes and connector ramps contemplated as part of the project alternatives will have the effect of moving some traffic closer to nearby homes. Therefore, under each alternative there may be localized areas where ambient concentrations of MSATs could be higher under the Build Alternatives than the No Build Alternative. However, as discussed above, the magnitude and the duration of these potential increases compared to the No-build alternative cannot be accurately quantified due to the inherent deficiencies of current models.

Conformity with the State Implementation Plan- This project is included in the conforming 2007 TIP and the *Transportation 2030 Plan*. The design concept and scope of the project are consistent with the design concept and scope in the RTP and TIP listings. Neither Build alternative of the project would delay or interfere with the timely implementation of any TCMs in the Bay Area. The proposed project has been determined to be in conformity with the SIP on the project level.

Construction Impacts: The proposed project would generate air pollutants during construction. Trucks and construction equipment emit hydrocarbons, oxides of nitrogen, carbon monoxide and particulates. Most pollution will consist of wind-blown dust generated by excavation, grading, hauling and various other activities. The impacts from the above activities would vary from day to day as construction progresses. The Special Provisions and Standard Specifications will include requirements to minimize or eliminate dust through the application of water or dust palliatives.

Recent studies have raised significant concerns about the health risks associated with emissions from diesel construction equipment. For PM_{10}, $PM_{2.5}$ or air toxics, there currently are no microscale requirements that are applicable at the project level for the temporary impacts in the construction phase.

The California Air Resources Board through its Diesel Risk Reduction Program has implemented, and will implement additional control measures that affect the construction phase of the project and, as regulations, are implemented through Standard Specifications 7-1.01F. These include: truck idling limitations, stationary and portable engine emission control programs, accelerated low-sulfur fuel availability, public vehicle fleet accelerated retrofit and replacement regulations, (pending) private truck fleet regulations, and (pending) off-road equipment fleet accelerated retrofit and replacement regulations. This

program will provide reduction of risks to public health through the reduction of construction and operational emissions.

Avoidance, Minimization, and/or Mitigation Measures: No project-level mitigation is currently proposed.

2.2.6. NOISE

Regulatory Setting- The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

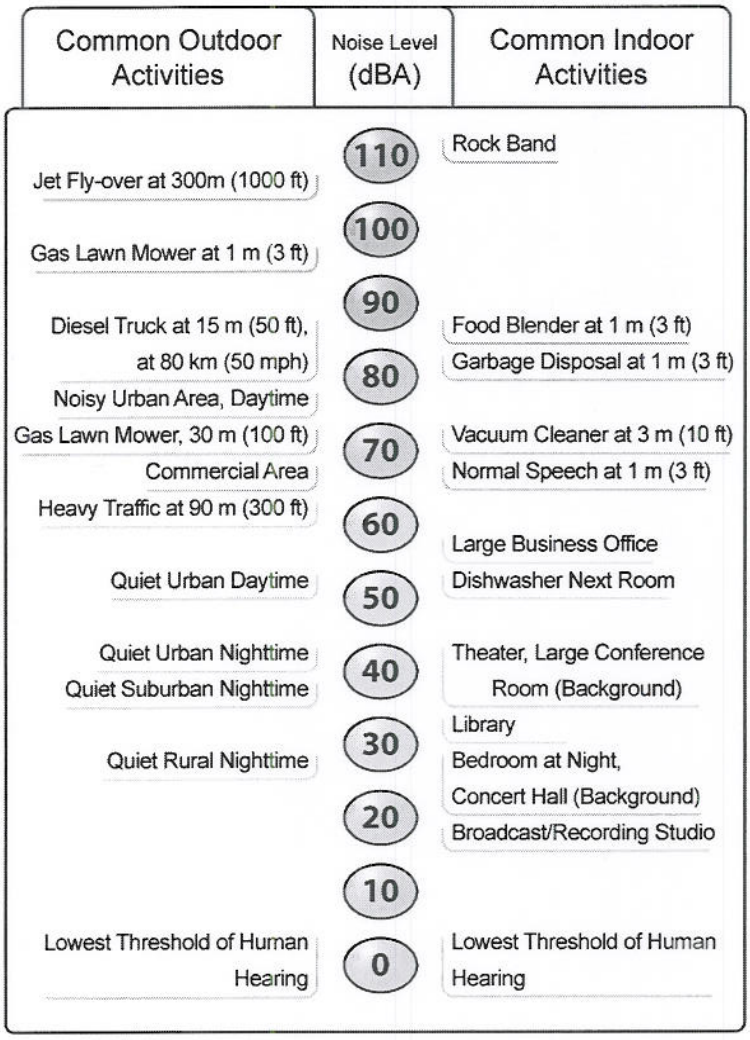
California Environmental Quality Act (CEQA)- CEQA requires a strictly no-build versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless such measures are not feasible.

National Environmental Policy Act and 23 CFR 772- For highway transportation projects with FHWA involvement, the Federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 dBA) is lower than the NAC for commercial areas (72 dBA). The following table lists the noise abatement criteria for use in the NEPA-23 CFR 772 analysis.

Table 2.2.6.1 FHWA's Noise Abatement Criteria (NAC)

Activity Category	NAC, Hourly A- Weighted Noise Level, dBA $L_{eq}(h)$	*Description of Activities*
A	57 Exterior	*Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose*
B	67 Exterior	*Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.*
C	72 Exterior	*Developed lands, properties, or activities not included in Categories A or B above*
D	--	*Undeveloped lands.*
E	*52 Interior*	*Residence, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums*

This table below lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise-levels discussed in this section with common activities.



In accordance with FHWA's Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (TNAP), August, 2006, a noise impact occurs when the future noise level with the project results in a substantial increase in noise level (defined as a 12 dBA or more increase) or when the future noise level with the project approaches or exceeds the NAC. Approaching the NAC is defined as coming within 1 dBA of the NAC.

If it is determined that the project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans

and specifications. This document discusses noise abatement measures that would likely be incorporated in the project.

The Department's *Traffic Noise Analysis Protocol* sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 5-dBA reduction in the future noise level must be achieved for an abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources and safety considerations. The reasonableness determination is basically a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include: residents acceptance, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, newly constructed development versus development pre-dating 1978 and the cost per benefited residence.

Affected Environment - This Noise Study addresses the traffic noise impacts in the project area for the proposed four-lane highway project on SR 12 from the SRs 29/12 Interchange in Napa County to Red Top Road in Solano County. The analysis for this project considered, among other things, land use activities, existing noise levels, future predicted noise levels under the "No Build" Alternative, Build Alternatives (1 & 2), and possible abatement measures, where *feasible* and *reasonable*.

The existing facility currently operates at full capacity. The current annual average daily traffic (AADT) for SR 12 at this location is approximately 30,000 vehicles. The AADT on this facility is expected to increase to a projected demand of over 60,000 vehicles by the year 2035. The current peak hour volume is 1500 vehicles per direction. By year 2035, the peak period volume is expected to increase to 4000 vehicles per direction.

Land uses along SR 12 in the project area are mostly residential, open space and commercial. At the SRs 29/12 interchange, there are some commercial buildings in the northeast quadrant. The other three quadrants are open space areas. Sensitive noise receptors considered for this study are the residences along SR 12 within the project limits, as well as outdoor areas intended for frequent human use. There are no sensitive noise receptors at the SRs 29/12 interchange. Activity Category B of the NAC in Table 2.2.6.1 applies to the residences within this project.

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Figures 2.2.6.1.1 to 2.2.6.1.6
Noise Receptor Locations

Methodology- Noise is defined as unwanted sound. A number of factors affect sound perceived by the human ear, including the level of sound, the frequencies involved, the period of exposure, and the changes or fluctuations in the noise levels during exposure. Levels of sound are measured in terms of decibels (dB). Since the human ear cannot perceive all frequencies equally well, measured sound levels are often adjusted, or weighted, to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA. All references to sound level in this report refer to A-weighted decibels.

For calculation of the highest existing and future noise levels, computer modeling was performed using the FHWA approved Traffic Noise Model (TNM) Version 2.5, which considers factors such as roadway configuration, gradient, traffic volumes, vehicle types, speed, terrain, shielding, and types of ground surface. TNM was also used in evaluating the effectiveness of sound wall proposals where impacted receptors were identified.

Impact- Noise impact is assessed for the outdoor area of a particular residence where the exposure to highway noise is the greatest, usually in its front or back yard. Some of the residential receptors in the project area have no usable yards on the highway side, as they are built on sloping terrain. Twenty-four hour measurements conducted on two different days showed that noise levels usually peaked in the morning hours.

The measurement sites, which are the same as most receptors in the project area, are sparsely located on both sides of SR 12. The analysis indicates there are two residences (receptors R6 and R9) that presently have noise levels higher than 66 dBA Leq (h) (see Table 2.2.6.2) in the yards facing the highway.

Noise measurements were taken in July of 2006 to determine the existing noise levels throughout the project area. At several locations, A Type II sound level meter, Metrosonics Model db-3100 Noise Monitor, was used to record the hourly average sound levels continuously for a 24-hour period. Traffic volumes were counted manually, concurrently with the measurements, for computer model calibration purpose.

For the purpose of noise studies, the vehicles on the freeways are classified as either automobile, medium truck or heavy truck. Percentages for the three types of vehicle, based on "2003 Annual Average Daily Truck Traffic on the California State Highway System", are 92.3%, 2.8% and 4.9% of the total volume, respectively.

Traffic noise impacts at sensitive receptors occur when future predicted noise levels with the project in place either 1) show a *substantial* increase (12 dBA or higher) from the

existing levels, or 2) approach or exceed the NAC established by the FHWA, as listed in Table 2.2.6.1. The term 'approach' is defined by Caltrans as one dBA below the criterion. For example, a residence with predicted future exterior noise levels of 66 dBA Leq (h) or higher would qualify for consideration of noise abatement. Noise abatement or mitigation measures must be considered for Type 1 projects when a noise impact is identified.

No-Build Alternative- Since the current traffic on SR 12 operates at full capacity, no increase in noise is anticipated in the future under the No-Build Alternative, provided the highway configuration remains unchanged. The future noise levels at the 2 residences (receptors R6 and R9) on SR 12 would exceed 66-dBA Leq (h) and, therefore, are deemed impacted by traffic noise.

Build Alternatives- Under the Build alternatives, there would be two lanes of traffic in the eastbound direction and two lanes of traffic in the westbound direction for SR 12. For residences on SR 12, future noise (see Table 2.2.6.2.) would increase from their existing levels, due to the added traffic volume and the decrease in distance to the traffic. The increases would be less than 3 dBA, which is barely perceptible to the average human ear. A total of four residences (receptors R3, R5, R6, and R9) are deemed affected by traffic noise, when the predicted future noise levels exceed 66 dBA Leq (h). The affected residential receptors all have direct line of sight of the highway. There would be no noise impacts for the SRs 29/12 interchange since there are no sensitive noise receptors.

There would be no *substantial* (12 dBA or more) noise increases for any receptors in the project area for the No-Build and Build Alternative.

A 4.20 m (13.1 ft) high, 145 m (475 ft) long sound wall along the edge of shoulder of westbound could reduce noise for receptor No. 9, a house on SR 12 at 5000 Jameson Canyon Road, by 5 dBA. The sound wall would be effective for an area that measures 145 meters (475 ft) along the frontage of the highway. It would break the line of sight from a truck stack to the receptor. Heights of sound wall are measured from the elevation at the edge of shoulder. Based on guidelines from Caltrans TNAP, the reasonable allowance for this sound wall is determined to be $34,000. Based on the unit price of sound wall at $250/sq.m, the estimate cost for this barrier will be about $150,000.

Table 2.2.6.2 shows the measured and the existing highest hourly noise levels at representative receptors. These receptors are located where the highest noise levels are most likely to appear in their immediate areas.

This table also shows the existing and future predicted noise levels under the No-Build, and Build Alternative, either with or without the sound wall in consideration.

Table 2.2.6.2

Receiver I.D No. #	Type, Address[2]	Approx. # of Receptors	Offset Distance to Centerline (m)	Existing Noise Levels Leq(h)[3], dBA		Predicted Noise Levels Leq(h), dBA year 2035		Heights of Barrier (wall)				Benefitted Receiver Cost
				Measured	Calculated	No Build	Build	3.0 m (10 ft)	3.6 m (12 ft)	4.2 m (14 ft)	4.9 m (16 ft)	
R1	SFR,134 JCR	1	83	-	61	62	62	N/A	N/A	N/A	N/A	N/A
R2	SFR,136 JCR	1	112	-	59	59	60	N/A	N/A	N/A	N/A	N/A
R3	SFR, 679 JCR	1	26	65	66	66	71	67	67	67	67	N/A
R4	SFR, 3875 JCR	1	62	-	62	62	65	64	64	64	64	N/A
R5	SFR, 3875 JCR	1	44	-	64	65	67	64	64	64	64	N/A
R6	SFR, 682 JCR	1	35	-	70	70	70	69	69	69	68	N/A
R7	SFR,685 JCR	1	65	-	62	63	65	N/A	N/A	N/A	N/A	N/A
R8	SFR, 686 JCR	1	63	-	62	62	65	N/A	N/A	N/A	N/A	N/A
R9	SFR,5000 JCR	1	40	-	67	67	69	64	64	64	64	N/A
R10	SFR, 3531 ST	1	100	59	60	60	61	N/A	N/A	N/A	N/A	N/A
R11	SFR, 1394 JCR	1	106	-	58	59	61	N/A	N/A	N/A	N/A	N/A
R12	SFR, 1394 JCR	1	94	-	60	60	61	N/A	N/A	N/A	N/A	N/A
R13	SFR, 1646 JCR	1	57	-	62	64	65	N/A	N/A	N/A	N/A	N/A
R14	SFR, 1687 JCR	1	71	-	62	63	64	N/A	N/A	N/A	N/A	N/A

Notes:

1. SFR - Single family residence.
2. JCR - Jameson Canyon Road. ST - Spurs Trail.
3. Leq(h) are A - weighted hourly noise in decibels.

Noise Abatements Considered- Noise abatement in the form of sound walls has been investigated for all affected receptors. Only those sound walls that are determined feasible and reasonable will be considered further for construction. Where feasible, noise barriers can be designed as sound walls, earth berms, or a combination of both and still provide comparable results, as long as their heights and locations are identical.

Feasibility- Only those noise abatement measures that are feasible and reasonable are considered candidates for construction. For the noise abatement measures to be considered feasible, a minimum of 5-dBA-noise reduction must be achieved at the

affected receptors. Feasibility also refers to engineering issues regarding the overall constructability, such as safety, topography, soil, drainage, and local access requirements.

The feasibility of the abatement measures being considered is determined by noise analysis and subsequent engineering studies.

Preliminary Reasonableness analysis involves the consideration of the cost of abatement, absolute noise levels, the date of development of the impacted residences, and the life cycle of the abatement. These factors are addressed by calculating the "reasonable allowance" per benefited residence using methodology outlined in the TNAP. If the estimated cost of the noise abatement measure under consideration is less than or equal to the calculated reasonable allowance, the measure is deemed *preliminarily* reasonable.

Final Reasonableness- All feasible noise abatement measures are further evaluated in the *final reasonableness* determination, which is subjective in that common sense and good judgment are exercised to arrive at a decision. The decision is based on, but not limited to, all factors in the preliminary reasonableness decision and the following considerations:

- Secondary environmental impacts of the abatement
- Views (opinions) of the impacted residents
- Input from public and local agencies
- Other social, economic, environmental, legal and technological factors

Views of the affected residents will be a major consideration in reaching a final decision on the reasonableness of abatement measures to be provided.

Avoidance, Minimization, and/or Mitigation Measures- None of the receptors within the project limits would have a 12 dBA or more increase in its future predicted noise levels as a result of any of the proposed Build Alternatives. Therefore, the project causes no significant noise increases and no noise mitigation will be necessary. Under CEQA, the project-generated noise increase would not cause a significant adverse environmental effect and the proposed noise abatements are not expected to have a significant effect on a competing resource.

Under certain conditions noise *mitigation* is required. When a traffic noise impact is due to a *substantial* noise increase (12 dBA or more) resulting from project generated traffic,

and the context and intensity of the increase is determined to be a significant adverse environmental affect due to traffic noise, then noise *mitigation* measures sufficient to eliminate the significant adverse environmental affect are required for project approval.

Undeveloped Lands- When traffic noise impacts are predicted for undeveloped lands for which a noise-sensitive development has received final approval from local jurisdiction before the date of public knowledge of the transportation project, noise abatement must be considered as part of the transportation project. Otherwise, noise abatements should be the responsibility of local agencies or private developers. The issuance of a building permit is generally considered to be the final approval of a development. The date of public knowledge shall be the date of approval of the final environmental decision document (e.g., a Finding of No Significant Impact or a Record of Decision).

Reasonableness Determination-The *preliminary reasonableness* of each sound wall will be determined individually by comparing its reasonable allowance with the estimated construction costs, when they become available. The *final reasonableness* decision will be made upon completion of the public involvement process and the project design.

The exact dimensions and locations of above sound walls are to be determined in final design. If project conditions are substantially changed during final design, these sound walls will be subject to re-evaluation. A final decision of the construction of the noise abatements will be made upon completion of the project design.

Sound Walls Not Feasible- TNM analyses show that, for residences situated right next to driveway entrances (receptors R3, R5, and R6), no sound walls within the State right-of-way could possibly reduce the noise levels by at least 5 dBA, the minimum amount required to be considered feasible. Consequently, no abatement will be recommended for these three affected residences under either of the Build Alternatives.

Construction Noise- Noise generated while constructing the road widening project could at times reach levels higher then the existing traffic noise. The impact from construction activities would be temporary and can be reasonably minimized by implementing provisions in Section 7-1.01I, "Sound Control Requirements" of the Caltrans Standard Specifications and the following measures:

- Avoid construction activities during nighttime and weekends, when possible.
- Consider constructing noise barriers as first items of work, where feasible.
- Use of stockpiled dirt as earth berms, where feasible.

- Erect temporary noise barriers, if necessary.
- Keep noisy equipment and haul roads away from sensitive receptors, where feasible.
- Keep the community informed of upcoming especially noisy construction activities and establish a field office to handle noise complaints.

2.2.7. ENERGY

Regulatory Settings- The California Environmental Quality Act Guidelines, Appendix F, Energy Conservation, require environmental documents to include a discussion of the potential energy impacts of proposed projects, with a particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy. The National Environmental Policy Act (42 USC Part 4332) requires the identification of all potentially significant impacts to the environment, including energy impacts.

Affected Environment- Transportation-related activities account for a substantial portion of the petroleum fuels used in California. We expect that transportation-related activities will continue to account for a substantial portion of the petroleum fuels used in California for many more years until there is a major transition to motor vehicles using other technologies and fuels. Until this future time, petroleum fuels must be used efficiently and conservatively because of the environmental impacts of their conversion to propel motor vehicles, construct transportation facilities, and operate and maintain transportation facilities and motor vehicles. There are also important political and environmental costs associated with extracting and refining petroleum fuels.

Impacts

Direct Energy
Direct energy is the energy expended to propel motor vehicles. Direct energy expenditures are dependent on many factors that relate either to motor vehicles or to the facility and traffic operations over which the motor vehicles travel. In general, if the fleet and mix of motor vehicle were similar, direct energy expenditures will be higher for the facility or alternative with:

1. higher traffic volumes, or
2. greater length, or
3. slower speeds (in the range 5 to 55 mph in urban settings or 5 to 35 mph in rural settings), or
4. more congested flow conditions, or

5. poorer levels of service, or
6. greater delay and travel times, or
7. longer queues, or
8. steeper grades

For the proposed project, we expect the total amount of direct energy expenditures resulting from the two Build alternatives to be similar. Both Build alternatives will have similar traffic volumes over the morning and evening peak periods, on a daily basis, on an annual basis, and over the twenty-year period following the construction of the project. Both Build alternatives will be approximately the same length. And both Build alternatives are expected to have similar traffic operations—as concluded in the *OPERATIONAL ANALYSIS FOR THE SR-12 WIDENING PROJECT & ROUTE 12/29 INTERCHANGE* for the Year 2035—on the mainline of SR 12, at connector ramps, and at the SRs 12/29 interchange.

We project each of the Build alternatives will result in less direct energy expenditures in comparison to the No-Build alternative. The energy savings would result from improved traffic operations (levels of service, speeds, flow conditions) for each of the Build alternatives in comparison to the No-Build alternative.

Indirect Energy- Indirect energy is the energy that is expended in the construction, operation, and maintenance of the highway facility, and the manufacture, maintenance, and replacement of parts of the motor vehicles that use the highway facility. In general, the indirect energy expenditures amounting from facility operation and maintenance and from vehicle manufacture, maintenance, and replacement of parts will be similar in magnitude for the alternatives of most projects. Construction energy expenditures will, however, vary with the proposed type of construction and will always be more for Build alternatives than No-Build alternatives.

Table 2.2.7.1

Type of Construction	Energy Factor (Btu per 1977$)
new rural freeway	$6.92x10^4$
new rural highway	$6.60x10^4$
widen rural freeway	$4.32x10^4$
widen rural highway	$4.65x10^4$
new urban freeway	$2.75x10^4$
new urban highway	$2.51x10^4$
widen urban freeway	$2.46x10^4$
widen urban highway	$2.33x10^4$
interchange	$7.01x10^4$
steel girder structure	$3.04x10^4$
concrete girder structure	$2.81x10^4$

Source: California Business, Transportation, and Housing Agency, Department of Transportation, Transportation Laboratory, Energy and Transportation Systems, by D. Talaga, J. Palen, M. Hatano, E. C. Shirley, July 1983, Table C:20, Page C-49.

The amount of energy to be used in the construction of the facilities in each of the Build alternatives of the proposed project will be more substantial than typical roadway projects. This is because the two Build alternatives require the hauling of material for cuts and fills, the construction of concrete retaining walls, and the construction of structures (bridges and connectors) for the SRs 29/12 interchange. The hauling of material for grading of the facility and for the formation of concrete retaining walls and bridges will be very energy intensive.

Total Energy Expenditures- Total energy expenditures are the sum of direct and indirect energy expenditures. For the proposed project, we only performed qualitative assessments of the direct and indirect energy expenditures. It is currently difficult to quantify future direct energy expenditures because: we are in a period in which many types of fuel are being tried for motor vehicle propulsion; the mix of vehicles (passenger cars, SUVs, crossover vehicles, light trucks, heavy trucks) on the roads may fluctuate substantially according to future economic and political trends; and motor vehicle fuel economy standards and efficiency have become stagnant, particularly for American made vehicles, but will begin to increase again under new legislation passed by the U. S.

Congress in December 2007. Indirect energy expenditures are also difficult to quantify at this time because construction methodology and equipment are evolving from the methodologies and equipment that were predominant in the 1960s and 1970s; consequently, our construction energy factors for quantifying construction energy expenditures need to be updated.

Cumulative Impacts- Together with other transportation and non-transportation projects that are proposed for Napa and Solano counties, the proposed Jameson Canyon project will result in an increase in the use of energy resources and the conversion of more petroleum and fossil fuels. This impact is unavoidable and is a concern because of the impact that the conversion of petroleum and fossil fuels has upon the atmosphere and environment. The mitigation of this problem needs to be accomplished at the regional, national and worldwide levels.

Secondary and Indirect Impacts- The proposed Jameson Canyon project may result in increased motor vehicle travel and direct energy/petroleum fuel expenditures. Increased motor vehicle travel and direct energy/petroleum fuel expenditures may, in turn, affect availability and prices for petroleum fuels, but are unlikely to have other substantial secondary or indirect energy impacts.

The Build alternatives will likely result in less direct energy expenditures in comparison to the No-Build alternative. The energy savings would result from improved traffic operations (levels of service, speeds, flow conditions) for each of the Build alternatives in comparison to the No-Build alternative.

Assuming that there are financial reasons to use energy efficiently or conservatively for the construction, operation, and maintenance of the proposed facilities, and the manufacture of motor vehicles that will use the proposed facilities, the Build alternatives are unlikely to result in wasteful indirect energy expenditures.

For these reasons, the proposed project is not expected to have a substantial or significant energy impacts.

2.3. Biological Environment

This section of the environmental document addresses the concerns surrounding plant and animal species, special-status species, regulated habitats and wetlands and Waters of the U. S. as they relate to the proposed project. This project may affect the federally, listed as, threatened California red-legged frog (CRLF; *Rana aurora draytonii*) and three vernal pool large branchiopod species including the endangered Conservancy fairy shrimp (CFS; *Branchinecta conservatio*), threatened vernal pool fairy shrimp (*Branchinecta lynchi*) and endangered vernal pool tadpole shrimp. Additionally, the project may affect the California state, listed as, threatened Swainson's hawk (*Buteo swainsonii*), and an additional fifteen California Department of Fish and Game (CDFG) amphibian, reptile, bird, and mammal species of special concern that may occur in the project area. The proposed project would affect oak woodlands, riparian forests, wetlands, and other waters occurring within the area.

All permanent and temporary affected areas and values provided in this analysis are based upon preliminary design data. Depending on whether the preferred final interchange build alternative is a Tight Diamond or Single Point configuration, permanent impacts include the potential loss of between 0.59 and 0.61 hectares (ha) [1.46-1.50 acres (ac)] of Coast Live Oak Woodland; 2.86-2.86 ha (7.07 – 7.06 ac) of Coast Live Oak – Willow Riparian Forest; 1.53-1.66 ha (3.77-4.10 ac) of unverified or potential wetlands; 0.19-0.20 ha (0.46-0.50 ac) of possible other waters; and an additional 26.23-23.93 ha (64.82-66.54 ac) of upland movement/aestivation habitat for CRLF. Permanent impacts also include the estimated loss of approximately 547 trees if the Tight Diamond Alternative is constructed, or 528 trees if the Single-Point Alternative is constructed.

Temporary habitat impacts to natural communities include potential loss of 0.61-0.63 ha (1.51-1.56 ac) of Coast Live Oak Woodland habitat; 1.70-1.71 ha (4.20-4.22 ac) of Coast Live Oak – Willow Ripariarn Forest, 2.08-2.21 ha (5.13-5.46 ac) of possible wetland habitat; 0.41-0.43 ha (1.02-1.05 ac) of possible other waters; and an additional 54.31-55.16 ha (134.21-136.30 ac) of upland movement/aestivation habitat for CRLF.

The Tight Diamond Alternative, which has been identified as the Preferred Alternative, will permanently remove 547 trees of which 476 are considered "native." The mitigation ratio for permanently affected native trees will be 3:1. Trees in the temporarily affected areas will be avoided to all extents possible.

Pages 159 to 162
Figures 2.3.1.1—Biological Study Area (BSA)
2.3.2.1a to 2.3.2.1c—Wetlands and Waters within the BSA

Permits expected for this project include a CDFG Section 1602 Lake and Streambed Alteration Agreement; a Clean Water Act (CWA) Section 404 Individual Permit from the U.S. Army Corps of Engineers (USACE); a CWA Section 401 Water Quality Certification permit from the Regional Water Quality Control Board (RWQCB); and a Biological Opinion–Section 7 Incidental Take Statement from the U.S. Fish and Wildlife Service (USFWS).

Caltrans will preferentially implement onsite mitigation for temporary impacts to natural communities as these impacts are identified in later stages of project design.

Caltrans is in the process of identifying mitigation sites for the implementation of onsite mitigation for permanent impacts to oak woodland, riparian forest, and wetland habitats. Where onsite mitigation is unavailable or infeasible, Caltrans will seek nearby offsite mitigation for permanent loss of habitats through the purchase of appropriate habitat or mitigation bank credits. Caltrans may participate in the preservation and restoration effort of at least 1.5 hectares (3.8 ac) to compensate for impacts to wetlands and other waters of the U. S. and 59.64 ha (147.38 ac) for impacts to CRLF breeding and movement/aestivation habitat, pending approval of the participating agencies. Additional preservation and restoration of vernal pool habitat may be necessary to compensate for impacts to federally-listed large branchiopods. Caltrans will mitigate for the loss of 476 native trees by restoring oak woodland and riparian woodland. Locations of tree replacement plantings will be established at on- and off-site locations to be determined by Caltrans and the regulatory agencies.

2.3.1 NATURAL COMMUNITIES

Regulatory Setting- This section discusses natural communities of concern. The focus of this section is on biological communities, not individual plant or animal species. This section also includes information on wildlife corridors and habitat fragmentation. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation involves the potential for dividing sensitive habitat and thereby lessening its biological value.

Habitat areas that have been designated as critical habitat under the Federal Endangered Species Act are discussed below in the Threatened and Endangered Species section 2.3.5. Wetlands and other waters are also discussed below in the following section 2.3.2.

Affected Environment- Topography in the project biological study area (BSA) is characterized by gradual, west-facing slopes of the Napa River Basin in the west portion of the project and steeper north- and south-facing slopes of Jameson Canyon in the east portion (See Figure 2.3.1.1, Biological Study Area).

From the SR 29/12 interchange, SR12 runs east then bends to the southeast and elevates to run along the north side of the canyon. At the Solano County line, (1.5 mi) southwest of Elkhorn Peak [405 m (1,330 ft)], SR 12 transitions from the Napa River watershed to the Suisun Marsh watershed and begins a gradual descent as it bends back to the east. The road grade descends more steeply as the Canyon opens onto the Suisun Basin and connects with Interstate 80.

Within the project BSA, several creek crossings occur. North of the interchange, SR 29 spans a perennial reach of Sheehy Creek. Looking east from the interchange, SR 12 spans a perennial reach of Fagan Creek, and numerous ephemeral tributaries to Fagan Creek. SR 12 also crosses ephemeral tributaries to the unnamed creek (referred to unofficially in some literature as Jameson Canyon Creek) in Solano County.

Appendixes G and H summarize the plant and animal species observed in the project BSA during field surveys. These lists are a compilation of species observed during field surveys and site visits in 2005 and 2006, as well as from project-specific field notes prior to 2004.

Land cover in the project BSA is annual grassland and ruderal, developed area, agricultural lands, coast live oak-willow riparian forest, alkali grassland, wetlands, waters, landscaped vegetation, and coast live oak woodland. A water treatment facility, within this BSA, provides low quality, land cover that is CRLF breeding habitat.

Seven vegetation community types occur within the project BSA. They are

1) annual grassland; and ruderal
2) coast live oak-willow riparian forest;
3) coast live oak woodland;
4) wetlands and waters;
5) alkali grassland;
6) landscaped vegetation; and
7) agriculture lands

A total of 1,250 trees were mapped within the project footprint (permanent and temporary effect areas) during the 2006 and earlier Caltrans surveys.

The primary wildlife habitats corresponding to these vegetation type communities are discussed here also. However, the vegetation types are defined by species composition while the corresponding wildlife habitats also include other physical environmental characteristics that provide shelter or other resources. Animals are mobile and may move from one vegetation type to another as required to meet feeding, breeding, nesting, and other life-cycle needs. Descriptions of each vegetation community type within the project area along with their corresponding wildlife habitats are described below.

1) Annual Grassland and Ruderal

California annual grassland is the most common community type, occupying approximately 52.4 percent of the project BSA. Dominant plant species within this type include non-native annuals including Italian ryegrass (*Lolium multiflorum)*, Italian thistle (*Carduus pycnocephalus)*, wild oats (*Avena barbata*), and soft cheat and ripgut grass (*Bromus hordeaceous* and *B. diandrus*). On the south-facing slopes of Jameson Canyon, black mustard (*Brassica nigra*), and fennel (*Foeniculum vulgare*), are locally common. Three native perennial grasses, purple needlegrass (*Nassella pulchra*), California oatgrass (*Danthonia californica*), and alkali rye (*Leymus triticoides*) are occasionally distributed, of which alkali rye is the most prevalent.

The term ruderal is used to describe plant species that occur in weedy, disturbed areas that are typically dominated by non-native annual or perennial species. Within the project BSA, this community is distributed within annual grasslands. Ruderal vegetation within the project BSA occurs along the roadway margins of SRs 12 and 29. Species typical of the ruderal community type include many of the species observed in the annual grassland community type including ripgut, wild oats, soft cheat, black mustard, fennel, Italian thistle, chicory (*Cichorium intybus*), Mediterranean mustard (*Hirshfeldia incana*), and bull mallow (*Malva nicaeensis*).

Annual Grassland and Ruderal Habitat:

Non-native annual grassland habitat composes most of the project BSA. Open grassland is an important habitat for some raptors such as red-tailed hawk (*Buteo jamaicensis)*, and American kestrel (*Falco sparverius)*. California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), and western meadowlark (*Sturnella neglecta*) are a few seedeaters that use grasslands for foraging and nesting. Insect eaters such as western scrub-jays (*Aphelocoma californica*), barn swallows (*Hirundo rustica*), and northern mockingbirds (*Mimus polyglottos*) use the habitat only for foraging. Mammals such as the California vole (*Microtus californicus*), pocket gopher (*Thomomys bottae*), and black-tailed jackrabbit (*Lepus californicus*) forage and nest within grasslands. California

ground squirrels (*Spermophilus beecheyi*) create burrows that also shelter other species. Mule deer (*Odocoileus hemiones columbianus)* use grasslands for grazing and resting at night. White tailed-kite (*Elanus leucurus*), loggerhead shrike (*Lanius ludovicianus*), and western burrowing owl (*Athene cunicularia hypugaea*) each have been observed foraging within annual grasslands within the BSA. Reptiles and amphibians rely on annual grassland for foraging and shelter; within the BSA, annual grassland provides upland movement/aestivation habitat for CRLF. Basins within annual grasslands also provide potential branchiopod habitat.

Ruderal habitat provides low-quality nesting and foraging opportunities for wildlife; however, they may provide upland movement/aestivation habitat for CRLF and basins within ruderal areas may provide potential branchiopod habitat. Wildlife species commonly found in ruderal and disturbed areas include white-crowned sparrow (*Zonotrichia leucophrys*), Brewer's blackbird (*Euphagus cyanocephalus*), American goldfinch (*Carduelis tristis*), black-tailed jackrabbit, and California ground squirrel.

2) Coast Live Oak Woodland

The coast live oak woodland vegetation type, occupying 0.8 percent of the project BSA, is best developed in east Jameson Canyon, particularly on the north-facing slopes. The dominant plant species is coast live oak (*Quercus agrifolia*) with California bay (*Umbellularia californica*), big-leaf maple (*Acer macrophyllum*), and California buckeye (*Aesculus californica*) as common associates. The canopy is closed, with a sparse understory of grassland species and with an infrequently dense shrub cover such as poison oak *(Toxicodendron diversilobum),* common snowberry *[Symphoricarpos albus* var. *laevigatus* (*S. rivularis*)], and Himalayan blackberry (*Rubus discolor*).

Coast Live Oak Woodland Habitat

Coast live oak woodlands provide habitat for a variety of wildlife species. At least sixty species of mammals may use oaks in some way. In California habitats where oaks form a significant part of the canopy or subcanopy, 110 species of birds have been observed during the breeding season. Cooper's hawk (*Accipiter cooperii)* may be expected to forage and nest within this habitat. Quail, wild turkeys (*Meleagris gallopavo)*, squirrels, and deer may be so dependent on acorns in fall and early winter that a poor acorn year can result in significant declines in their populations. Coast Live Oak Woodland provides upland movement/aestivation habitat for CRLF.

3) Coast Live Oak – Willow Riparian Forest

This type of riparian forest is limited to mesic areas, occupying 6.0 percent of the project BSA, and is found bordering the upper reaches of many of the creeks and tributaries within the project BSA. Coast live oak comprises the dominant tree species, red willow (*Salix laevigata)*, arroyo willow (*S. lasiolepis)*, and yellow willow (*S. lucida* ssp. *lasiandra*) occur as common associates. A second oak species, valley oak (*Q. lobata*) also frequently occurs. The understory is often sparse and devoid of herbaceous species cover, but occasionally can be very dense and populated by native perennial taxa including common snowberry, Santa Barbara sedge (*Carex barbarae*), California blackberry (*R. ursinus*), and horsetail (*Equisetum telmateia* ssp. *braunii*).

Coast Live Oak-Willow Riparian Forest Habitat

Riparian areas are critical to many species of wildlife, including amphibians, reptiles, birds, and small and large mammals. These riparian areas provide cover, food, water, foraging, breeding and nesting habitat. The linear configuration of riparian areas creates corridors for animal movement that are critical for wildlife migration and dispersal. Typical species expected to occur in this habitat type within the project BSA include black phoebe (*Sayornis nigricans*), California quail, red-tailed hawks, raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and gray fox (*Vulpes cinereoargentius*).

Coast Live Oak-Willow Riparian Forest provides upland movement/aestivation habitat for CRLF.

4) Wetlands and Waters

Wetlands and waters are distributed occasionally throughout 3.8 percent of the project BSA as depressional swales or ditches or in hillside seeps that are formed due to hydrologic conditions created by impermeable or semi-permeable clay soils or rocky substrates. Wetland community types present vary considerably along the project BSA, and include: riparian, seasonal (ephemeral pool), perennial (marsh), ponds, ditches and intermittent drainages, many of which function to convey roadside runoff. Some of these features support hydrophytic (wetland) vegetation and are referred to as wetlands. The unvegetated features are waters of the U. S. The dominant plant species observed in the wetland habitat types in the BSA are listed below.

Dominant and co-dominant plant species frequently observed in the wetland community type include brown-headed rush (*Juncus phaeocephalus var. paniculatus*) and creeping spikerush (*Eleocharis macrostachya*). Other wetland species such as Mexican rush

(*J. mexicanus*), and common bulrush (*Schoenoplectus acutus*) are more locally distributed.Brown headed rush also occurs in small ephemeral wetlands on the open flats in the Napa Valley portion of the project BSA.

Wetland and Waters Habitat

Wetland habitat varies considerably throughout the project BSA, and includes riparian, seasonal (ephemeral pool), and perennial (marsh) wetlands as well as ponds, intermittent drainages, and ditches, some of which function to convey roadside runoff. Wetland habitat is among the most productive wildlife habitat in California; it provides food, cover, and water for numerous amphibian, reptile, bird, and mammal species. Many species rely on wetland habitat for their entire life cycle. Wetlands and waters provide aquatic breeding and aquatic movement/aestivation habitat for CRLF, foothill yellow-legged frog (*Rana boylii)*, western pond turtle (*Clemmys marmorata marmorata)*, and tricolored blackbird (*Agelaius tricolor*). Potential branchiopod habitat may be co-located with wetland and waters.

5) Alkali Grassland

Alkali grassland is limited to areas west of SR 29 near the Napa County Airport, occupying 2.7 percent of the project BSA. It is dominated by saltgrass (*Distichilis spicata*) but alkali rye, fat hen (*Chenopodium album*), and pitseed goosefoot (*C. berlandieri*) are also present.

Alkali Grassland Habitat

Alkali grasslands provide upland movement/aestivation habitat for CRLF, and basins within alkali grasslands may provide potential branchiopod habitat. Alkali meadows are generally too wet to provide suitable habitat for small mammals; however, in late summer small mammals may visit alkali meadows that have dried. Mule deer may feed in alkali meadows, seeking forbs and palatable grasses. Waterfowl, especially mallards (*Anas platyrhynchos*), frequent streams flowing through alkali meadows. Yellow-headed (*Xanthocephalus xanthocephalus*) and red-winged (*Agelaius phoeniceus*) blackbirds occasionally nest in alkali meadows with tall vegetation and with adequate water to discourage predators Various amphibian species are abundant in wet meadows throughout California.

6) Landscaped Vegetation

Several trees and shrubs typical of landscaped or ruderal environments also occur within 1.7 percent of the project BSA. These include species such as coast redwood (*Sequoia sempervirens)*, cork oak (*Quercus suber*), blue gum (*Eucalyptus globulus*), edible fig (*Ficus carica*), silverleaf cotoneaster (*Cotoneaster pannosa*), peach (*Prunus persica*), and firethorn (*Pyracantha coccinea*). The Tree Survey Report Appendix L provides additional details on trees planted within the BSA.

Landscaped Vegetation Habitat

Landscaped vegetation habitat within the project BSA is primarily represented by the golf course south of SR 12 in Napa County, although to a lesser extent it includes landscaping associated with commercial and industrial development near the SRs 29/12 interchange, gardens and lawns in the residential areas on both sides of SR 12 through Jameson Canyon, and stands of non-native trees. Within landscaped habitat, areas with mature vegetation closely approximate the natural environment. In general, wildlife diversity increases and species density decreases while proportionately greater numbers of native species occur. Bird species that may be observed in landscaped vegetation include wrentits (*Chamaea fasciata*), bushtits (*Psaltriparus minimus*), oak titmouse (*Baeolophus inornatus*.), chestnut-backed chickadee (*Poecile rufescens*), California quail. Common mammals are black-tailed deer and black-tailed jackrabbit. Gopher snake (*Pituophis catenifer*) and western fence lizard (*Sceloporus occidentalis*) also occur in this habitat. Landscaped vegetation provides upland movement/aestivation habitat for CRLF.

7) Agricultural Lands

Agriculture lands occupy 12.3 percent of the project BSA and are composed primarily of active vineyards that occur from Kelly Road east to the Napa/Solano County line, but could include active or remnant orchards and strawberry farms. In this study, agricultural land does not include pasture, which is instead discussed in this Section in Annual Grassland.

Agricultural Lands Habitat

Agriculture within the project BSA is primarily represented by vineyards that occur from west of Lynch Canyon Road to west of the Napa/Solano County line. Vineyards have been planted on deep fertile soils that once supported productive and diverse natural habitats. Larger and more diverse populations of wildlife were also supported by these native habitats; however, some species of birds and mammals have adapted to the vineyard habitats. Many have become "agricultural pests," which has resulted in intensive efforts to reduce crop losses through fencing, sound guns, or other management

techniques. Wildlife, such as deer and rabbit, browse on the vines; other wildlife, such as squirrel and numerous birds, feed on fruit. Some wildlife (e.g., mourning dove) are more passive in their use of the habitat for cover and nesting sites. Because grape vines are deciduous and relatively short in height, compared to orchards, they do not provide significant wildlife cover during cold and wet winter months. Many wildlife species act as biological control agents by feeding on weed seeds and insect pests; however, poison baits are often used to control birds and other animals that feed on grapes and berries, which may in turn be detrimental to species that prey on pest species. Vineyards and areas with excessive vegetation density do not support sufficient prey populations for Swainson's hawk (*Buteo swainsoni*), and the intensive management does not make vineyards suitable upland dispersal habitat for CRLF.

Regional Special-status Species and Habitats of Concern

Three sensitive community types, five habitats of concern (i.e., natural community types with an extent limited to within California) and critical habitat for eleven federally endangered species, fifty-one sensitive plant species (Appendix G), and seventy-one sensitive animal species (Appendix H) were recorded. These tables, provide a compilation of those habitats and species obtained from CNDDB, CNPS, and USFWS database and include information pertaining to each species' habitat requirements and the likelihood that those habitats are present within the project BSA.

Tree Survey

A total of 1,250 trees (comprised of twenty-three tree species) occur within the permanent and temporary work areas. A few areas were not surveyed because of safety concerns related to working within the Right of way of the active roadway. Also because of access restrictions. The majority of the trees observed are native, riparian and woodland species such as coast live oak, willow (*Salix* spp.), California bay laurel, and white alder (*Alnus rhombifolia*).

A few native tree species such as Monterey pine (*Pinus radiata*) were observed in areas that were clearly landscaped. Also, they are outside their known natural range and thus were excluded from the native tree percentage.

The remaining trees within the BSA including the temporary work area are non-native or are native to California but are clearly outside their natural range and are used as a landscaping tree. These trees are considered part of the landscaped vegetation community type.

Impacts

Vegetation- The following natural vegetation types occur within the BSA and are considered sensitive, coast live oak woodland, coast live oak-willow riparian forest, and wetlands. Alkali grassland is a natural community type but is considered part of the seasonal wetland habitat, which is described separately. Waters of the U. S. are also considered sensitive but these habitats are typically not vegetated and are discussed separately in Section 2.3.2. Physical characteristics of the natural community types are described in this section. Habitat mapping results for the terrestrial natural habitat types (coast live oak woodland and coast live oak - willow riparian forest) are also discussed in the affected environment in this section.

The remaining habitats present within the BSA (e.g., annual grassland) are not natural community types and are not considered sensitive; therefore, they are not discussed further in this section.

Table 2.3.1.2 shows the results of habitat mapping within the BSA by habitat type and project element.

Impacts to sensitive natural and urban habitats are shown in Table 2.3.1.2. Table 2.3.1.3 provides the acreages of non-native or urban vegetation community types present in the BSA. Results of habitat mapping show that the annual grassland and ruderal vegetation type is the most prevalent habitat throughout both the canyon and interchange portions of the project, totaling 66.9 ha (165.2 acres). Agricultural lands are the next most common vegetation type, encompassing 14.1 ha (34.7 ac).

Habitat- The two proposed alternatives are similar in many respects, and the amount of impact potentially occurring to the two natural sensitive types is expected to be the same regardless if the preferred final interchange build alternative is a Tight Diamond or Single Point configuration. The permanent habitat impacts to coast live oak woodland habitat are 0.6 ha (1.5 ac), with impacts to coast live oak – willow riparian habitat totaling 2.9 ha (7.1 ac).